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### Research Article

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## Interpretative notes on the species of the genus *Ennomos* Treitschke in Turkey (*Lepidoptera, Geometridae*)

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**Abstract:** Interpretative notes on the species of the genus *Ennomos* Treitschke in Turkey (*Lepidoptera, Geometridae*). *Cesa News* 122: 1-10, 9 figs.

In this paper, the species of genus *Ennomos* Tr. in Turkey are given. Nomenclatural, identification, and faunal problems of some species are discussed. Synonyms, distributional information are mentioned. Three new provincial records are reported for *Ennomos fraxineti*. Male and female genitalia, as well as tympanal organs and adult images of some species are given.

**Key words:** *Ennomos*, *Geometridae*, *Lepidoptera*, Turkey, fauna, distribution, nomenclature, tympanal organ.

The valid genus name *Ennomos* was established by Treitschke in 1825. According to some authors, the genus is divided into two subgenera, *Deuteronomos* L.B.Prout,1914 (type-species *Phalaena alniaria* L.), and nominate subgenus (type-species *Eugonia autumnaria* Wrn.) (Koçak & Kemal, 2015a,b). In the latest publication, Skou & Sihvonen (2015) discussed 8 European species under the genus *Ennomos* Tr. These are *autumnaria* (Werneburg,1859), \**quercinaria* (Hufnagel,1767), *alniaria* (Linn., 1758), \**fuscantaria* (Haworth,1809), *effractaria* (Freyer,1841), \**erosaria* (Denis & Schiff.,1775), \**quercaria* (Hübner,1813). The species marked with \* occur also

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in Turkey. Additionally, *E. fraxineti* Wiltshire, 1947, described from northern Iran, was also reported from South Turkey (Wehrli, 1934; Wiltshire, 1947, 1957). As a result of this, the genus *Ennomos* Tr. is represented by 5 species in Turkey.

### Annotated list of the species of *Ennomos* Tr. in Turkey

# denotes unavailable name according to the ICZN

**1 - *Ennomos (Deuteronomos) erosarius* (Hübner, 1790)** Original reference: *Phalaena erosaria* Hübner, 1790, Beitr. Gesch. Schmett. 2 (4): 100, 128, (4) 4: fig. Z. Synonyms: #*erosaria* [Denis & Schiffermüller], 1775; *erosaria* Hübner, 1790; *tiliaria* Hübner, 1790; *crassaria* Fabricius, 1804; *quercinaria* Borkhausen, 1794; *unicoloria* Esper, [1801]; *ochraria* Stephens, 1831. Range (in codes): MA Ifr DZ Cst PT ES FR IT GB BE NL LU DE CH AT PL CZ SK HU RO YU BG Cc GG TR DK NO SE FI EE LV LT RU MD UA BY 12 12A 12Ab 12E

**2- *Ennomos (Deuteronomos) fraxineti* Wiltshire, 1947** Original reference: *Ennomos* ? *effractaria* ssp. *fraxineti* Wiltshire, 1947, Entomologist's Rec. J. Var. 59: 111, pl. v fig. 11. Holotype ♂: Tehran: Darband, 6000ft. Synonyms *effractarius* sensu Wehrli, 1934; *fuscantaria* sensu Wiltshire, 1946; *fraxineti* Wiltshire, 1947 Range (in codes): TR IR Elb Th Gls IQ Slf 13 30 42? 44? 56 80 13C 13Cd 30B 30Bc 42B? 44L? 56F 56F 56Fq 80B 80Bb

**3- *Ennomos (Deuteronomos) fuscantarius* (Haworth, 1809)** Original reference: *Geometra fuscantaria* Haworth, 1809, Lepid. Br. (2): 295. Syntypes: Britain. Synonyms: *fuscantaria* Haworth, 1809; *effractarius* sensu auct. Range (in codes): MA TN DZ Sbd Dzc Orn TR PT ES FR IT Si GB BE NL LU DE CH AT PL CZ SK HU RO YU HV B-H Mk GR BG DK NO SE FI EE LV LT RU MD UA Cm Cc GG BY CY 22 34 44?

**4- *Ennomos (Deuteronomos) quercarius* (Hübner, [1813])** Original reference: *Geometra quercaria* Hübner, [1813], Samml. eur. Schmett. 5: pl. 80, figs. 411, 412. Syntypes: Europa. Synonym: *quercaria* Hübner, [1813] Range (in codes): PT ES An FR Si IT CH AT PL SK HU RO YU MK AL BG GR Cr TR Cc GG AZ AM IR Gls Fa IQ RU MD UA Cm BY CY Cr LB Bsa IL Pa JO 05 07 14 31 33 34 42 55 56 60 05A 14I 31A 31Ab 42B 55F 56F 56Fb

**5- *Ennomos (s.str.) quercinarius* (Hufnagel, 1767)** Original reference: *Phalaena quercinaria* Hufnagel, 1767, Berl. Mag. 4 (5): 520, 624. Type(s): Deutschland: Berlin. Synonyms: *quercinaria* Hufnagel, 1767; *angularia* [Denis & Schiffermüller], 1775; *equestraria* Fabricius, [1776]; *zona* Fourcroy, 1785; *carpinaria* Hübner, [1799] Range (in codes): ES FR Co Si IT IE GB BE NL LU DE CH AT PL CZ SK HU RO YU HV B-H MK AL BG GR TR Cc GG AZ AM IR Gls DK NO SE LV LT RU MD UA Cm BY 11 14 34 39 14B 14I 81 81F

### Comments on the *Ennomos* species in Turkey and some explanation of the annotated list given above

#### *Ennomos (Deuteronomos) erosarius.*

The valid name of the species was named and described by Hübner (1790). The species is widely distributed from North Africa, Europe to Caucasus. In Turkey, the reliable record is from Bingöl Prov. (Solhan) [range code: 12E] (Riemis, 1996). In the present paper, we report the second record in the same province, from the Kuruca Pass [range code: 12Ab], near degraded *Quercus* woodland at 1700m high above sea level.

Material studied: 1♀. Bingöl Province [range code: 12], Kuruca Pass 1700m, 16 10 2013 (second generation), M. Kemal & A. Koçak leg. (coll. Cesa) (**Fig.1**). Genital dissection (GP2267♀) by M. Kemal (**Fig.2**).

Identity of the female genitalia between *erosarius* and *quercarius* is based upon: "lamella antevaginalis has sclerotised lateral arms and base of ductus seminalis has small lobe" in *erosarius*. However, these structures are not recognizable (Skou & Sihvonen, 2015: 276, 573). On the other hand, the shape of the transversal lines on forewing upperside distinguish rather well these two species.

This species is known only from Bingöl Province.

### ***Ennomos (Deuteronomos) fraxineti.***

The species was described by Wiltshire (1947) from northern Iran. Before the description, Wiltshire identified wrongly the north Iranian *Ennomos* material as “*fuscantaria*” (Wiltshire, 1946). Description of *fraxineti* in 1947 was based on the Wehrli’s evaluations of the southern Turkish *Ennomos* material, identified by Wehrli as “*effractaria*”. Wehrli distinguished his “*effractaria*” by using its male genitalic features from Düldül Dagh (northern Amanus), currently in the province Osmaniye [range code: 8o] (Wehrli, 1934: 38-39, Taf.iv fig.10). This record is now considered as *fraxineti* (see also comment, Wiltshire, 1947). Taxonomic treatments by Wehrli and Wiltshire are formulated above in the synonymy of *fraxineti*.

As to our material, we report here two localities, Ağaçköprü (Bitlis Province [range code: 13], and Kırıkdağ (Hakkari Province) [range code: 30]. Separately, 2 ♂ from Şirvan is identified by first author as *E. fraxineti*. All these records are new for the provinces faunistically!

Wehrli (1934) reported also his “*effractaria*” from Akşehir (Konya Province), and Malatya (in Museum Wien). On the other hand, Skou & Sihvonen (2015) identified the *Ennomos* material from Malatya as “*fuscantaria*”. It is clear that externally *fuscantaria* and *fraxineti* are very similar to each other. Caterpillars of both species are *Fraxinus* feeders. Therefore, they share the same type of habitat. The reliable identification is possible only examination of the male genitalia. Under these circumstances, we have suspicion about the published identities of the materials from Konya [range code: 42], and Malatya [range code: 44].

Material studied: 1♂. SE Turkey, Hakkari Province Kırıkdağ 1580m (30Bc1), 4 7 2011, light trap, M. Kemal & A.Koçak leg. (coll. Cesa). Genital dissection (GP2265♂) by M. Kemal (**Fig.3**). 1♂. SE Turkey, Bitlis Province, Ağaçköprü 1350m (13Cd), 1 11 2013, M. Kemal & A.Koçak leg. (coll. Cesa) (**Fig.4**). Genital dissection (GP2264♂) by A.Koçak (**Fig.5**). 2 ♂. SE Turkey, Siirt Province, Şirvan Cevizlik 1500m [range code: 56Fq], 7 7 2013 and 5 9 2013, respectively; E.Seven leg. (coll. YYUIRC). Genital dissections (GP2271♂, GP2272♂) by M. Kemal (**Fig.6**). Tympanal organ is also illustrated here for the first time.

This species is known from South Turkey (Osmaniye, Bitlis, Hakkari, and Siirt Provinces).

### ***Ennomos (Deuteronomos) fuscantarius.***

The valid name of the species was described by Haworth (1809) from Britain. In North Africa, the species is represented by the subspecies, *algeriensis* L.B.Prout. In Europe, Caucasus, East Europe to Urals (Russia), the species is represented by nominate subspecies.

In many places in Europe, even in South Turkey, the species *fuscantarius* identified erroneously as “*effractarius*” (sensu auct.) nec Frr. This case was discussed by Skou & Sihvonen (2015). True *fuscantarius* is represented in Thrace region in Turkey. Records of *fuscantarius* in South Turkey (Amanos, Malatya, etc.) are doubtful (cf. Skou & Sihvonen, 2015).

Male genitalia of *Ennomos fuscantarius* Hw. was illustrated by Wehrli (1934, Taf. iv fig.11) for the first time.

This species is currently known in Turkey only from Turkey-in-Europe.

### ***Ennomos (Deuteronomos) quercarius.***

The valid name of the species was described and illustrated by Hübner (1813) from Europe. This species is widely distributed in Europe, also known in Middle East countries. In Turkey, it has been reported from 10 provinces so far.

Material studied: 1 ♂. SE Turkey, Siirt Prov., Şirvan Maden crossing-road 960m (56Fb) light trap, M. Kemal & A.Koçak leg. (Cesa) (**Fig.7**). Genital dissection (GP2266♂) by M. Kemal. Male tympanal organ on the first abdominal segment is also illustrated here for the first time (**Fig.8**). When compared, it can be easily seen that the remarkable differences in shape of the tympanal cavity and its accessories in *Ennomos fraxineti* and *Ennomos quercarius* (**Figs. 6, 8**).

Kemal & Seven (2013) listed this species from Şirvan (Siirt Province). Seven (2014) also reported *E. quercaria* from various localities of Şirvan district (Siirt Prov.) in his unpublished thesis.

This species is the best known one in Turkey, recorded from 10 provinces (%12 of all Turkish provinces).

***Ennomos (s.str.) quercinarius.***

The valid name of the species was described by Hufnagel (1767) from Berlin (Germany).

Material studied: 5♂. Düzce Province, Yiğilca, Karadere Findikli, [range code: 81F] A. Koçak leg. (Koçak, 1990). Genital dissection (GP1268♂) by A. Koçak in 1990 (**Fig.9**).

Koçak (1992) reported this species from Bilecik Province [range code: 11]. The species is also known from Bolu Province (Özdemir, 2007), İstanbul [range code: 34], and Kırklareli Prov. [range code: 39]. Its present knowledge on the distribution is restricted to forest zone of NW Turkey, but expected from all parts of northern Turkey.

Status and nomenclatural solution of the name *effractaria* Freyer.

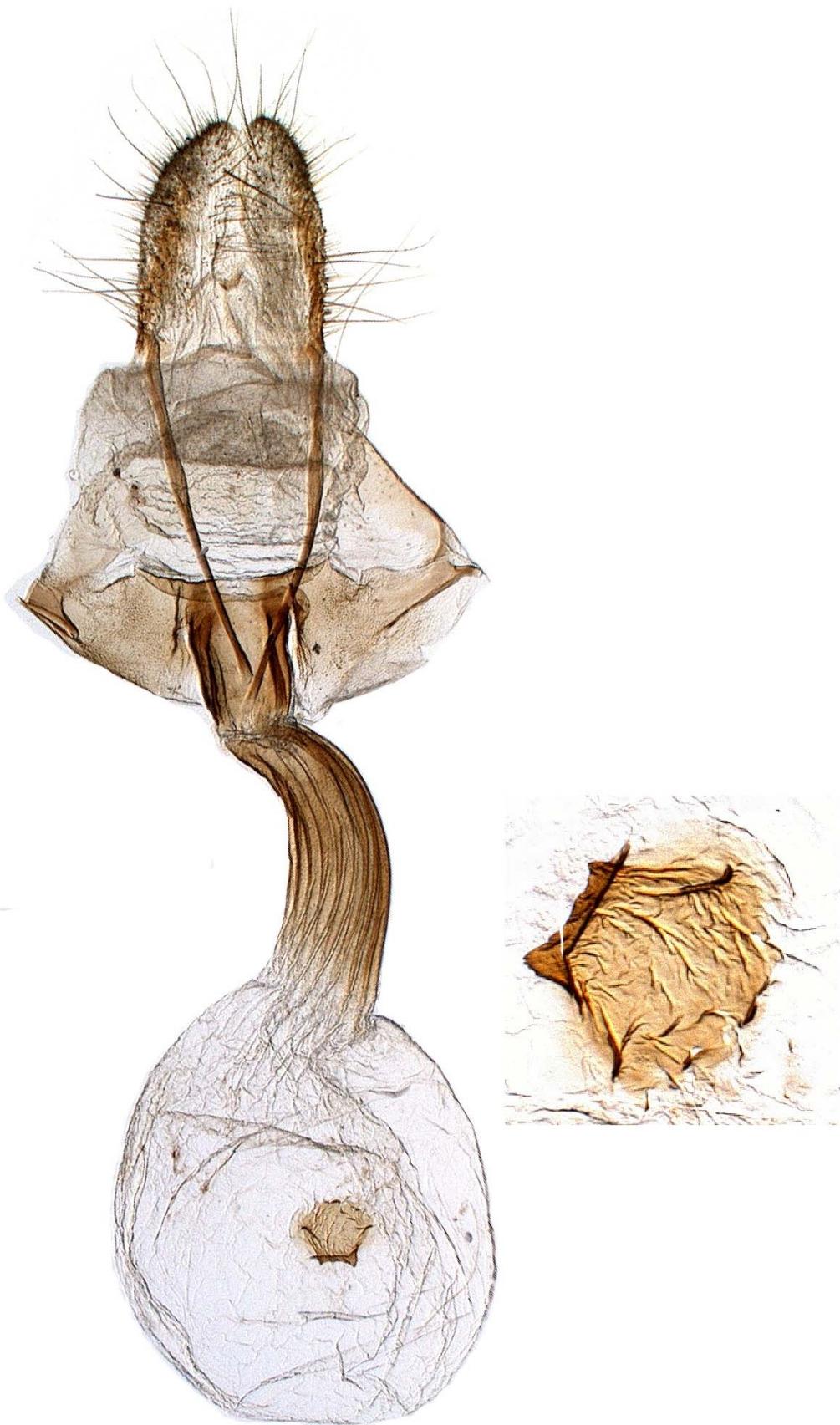
Freyer described and illustrated the specific name *effractaria* based upon the syntypes collected from Russia (Sarepta). Skou & Sihvonen (2015: 274-275) declared that all the examined material in Russia, similar to *effractaria* are in fact *E. fuscantaria*. For that reason, Skou & Sihvonen considered *effractaria*'s status uncertain. In order to solve this problem, male genitalia of the syntypes of *effractaria* Freyer must be examined. In case of nonexistence this material, a neotype for *effractaria* Freyer must be selected for examination. Definition of "status uncertain" is not a way of final scientific solution.

On the studied material of this paper

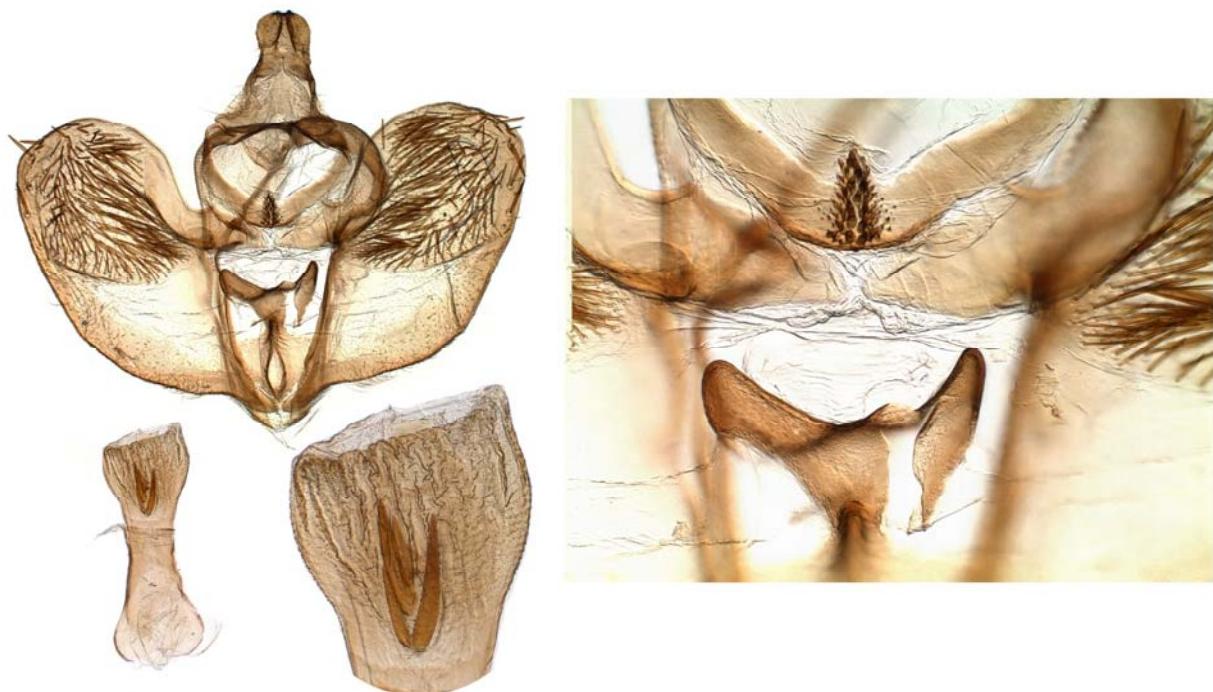
As it can be easily seen that the examined material for this paper is very few. The reason of this is explained as follows: Especially East Turkey, trying overcome a dirty war period, is under serious threat for several years. Therefore, our most of the unstudied materials collected by us from this region were transferred to Ankara due to their security. In fact, studying in the remote area in East Turkey, is nowadays completely unsafe. For that reason, studying in East Turkey is only possible our devotion to the science.

**Images**

**Fig. 1 – *Ennomos erosarius*.** Female, before dissection (see below). Bingöl Province Kuruca Pass 1700m, 16.10.2013, photo M. Kemal (Cesa).



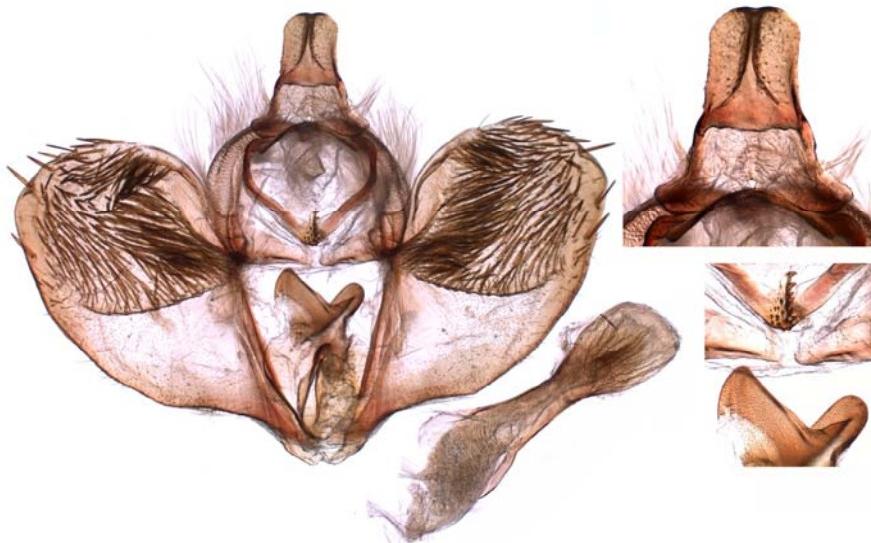
**Fig. 2** – Female genitalia and enlarged signum on bursa copulatrix of *Ennomos erosarius*. Bingöl Province Kuruca Pass 1700m, 16 10 2013. Genital dissection (GP2267♀) by M. Kemal (Cesa).



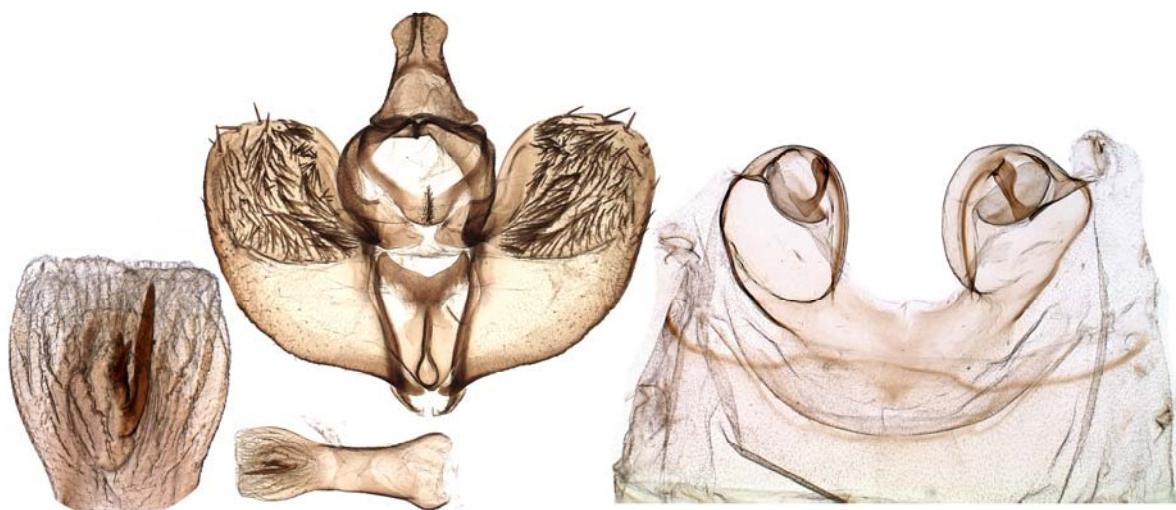
**Fig. 3** – *Ennomos fraxinetti*, male genitalia (GP2265♂), with cornuti of aedeagus, and comb-like, scobinated gnathos. SE Turkey Hakkari Prov., Kırıkdağ 1580m, M. Kemal (Cesa)



**Fig. 4** – *Ennomos fraxinetti*, male before dissection (see below). E. Turkey, Bitlis Prov., Ağaçköprü, photo M. Kemal (Cesa)



**Fig. 5** - *Ennomos fraxinetti*, male genitalia (GP2264♂), with enlarged ventral side of uncus and comb-like, scobinated gnathos. E. Turkey, Bitlis Prov., Ağaçköprü, A.Koçak (Cesa)



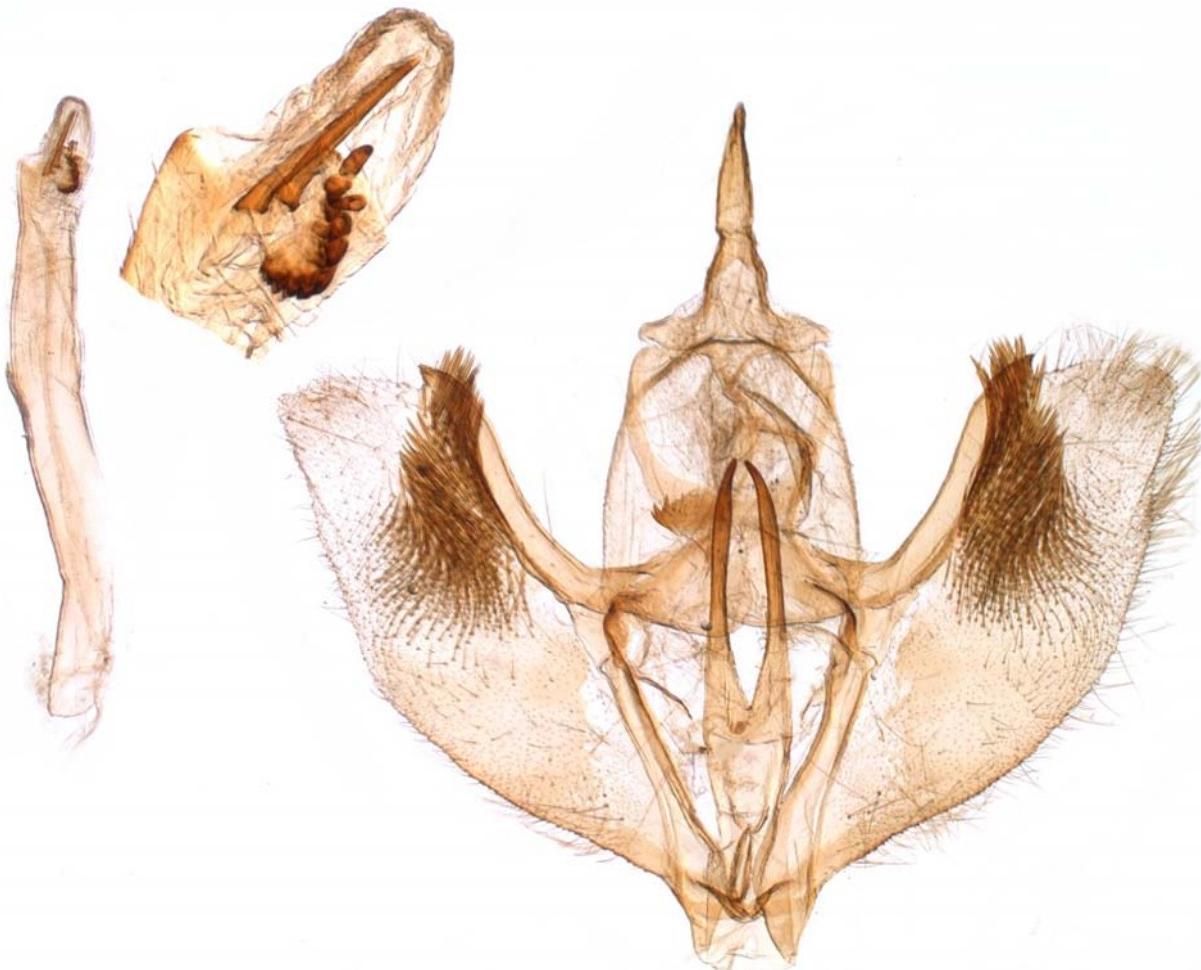
**Fig. 6** - *Ennomos fraxinetti*, male genitalia (GP2271♂), with enlarged cornuti of aedeagus and paired tympanal organ on the first abdominal segment (compare with **fig. 8**). SE Turkey, Siirt Province, Şirvan Cevizlik 1500m, leg. E.Seven. preparation & photo M.Kemal (Cesa)



**Fig. 7 –** *Ennomos quercarius*. Male, before dissection (see below). SE Turkey, Siirt Prov., Şirvan Maden road 960m (56Fb), M. Kemal & A. Koçak leg. (Cesa)



**Fig. 8 –** *Ennomos quercarius*. Male genitalia (GP2266♂), with enlarged cornuti of aedeagus and paired tympanal organ on the first abdominal segment. SE Turkey, Siirt Prov., Şirvan Maden road, M. Kemal (Cesa).



**Fig. 9** – *Ennomos quercinarius*. Male genitalia (GP 1280♂), with enlarged cornuti of aedeagus. NW Turkey, Düzce Prov., Yiğilca, A.Koçak, 1990 (Cesa).

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